

## CLAIMS

What is claimed is:

1. A power supply system for providing reliable electrical power to a telecommunications facility, said facility containing telecommunications equipment, said system comprising:

at least one proton exchange membrane, said proton exchange membrane including a fuel input and an electrical output, said proton exchange membrane operable to receive fuel at said fuel input and to generate DC electrical power at said electrical output;

at least one rectifier, said rectifier including an AC input and a DC output, said rectifier operable to convert AC electrical power received from an AC power source at said AC input to DC electrical power at said DC output; and

at least one capacitor coupled to said electrical output of said at least one proton exchange membrane and said DC output of said at least one rectifier.

2. A system as set forth in claim 1 wherein said fuel for said at least one proton exchange membrane is hydrogen.

3. A system as set forth in claim 2 wherein said hydrogen is stored on site.

4. A system as set forth in claim 1 wherein said AC power source is a commercial utility.

5. A system as set forth in claim 1 wherein said AC power source is at least one microturbine generator.

6. A system as set forth in claim 1 wherein said AC power source is a diesel generator.

7. A system as set forth in claim 1 further comprising a switching mechanism coupled between said at least one proton exchange membrane and said at least one capacitor, said switching mechanism operable to be an open circuit so long as said DC output from said at least one proton exchange membrane remains below a predetermined value and to be a short circuit when said DC output from said at least one proton exchange membrane exceeds said predetermined value.

8. A system as set forth in claim 7 wherein said predetermined value is 48 volts DC.

9. A system as set forth in claim 7 wherein said predetermined value is 200 amps DC.

10. A system as set forth in claim 1 further comprising a switching mechanism coupled between said AC power source and said at least one rectifier, said switching mechanism operable to be a short circuit so long as said DC output from said at least one proton exchange membrane remains below a predetermined value and to be an open circuit when said DC output from said at least one proton exchange membrane exceeds said predetermined value.

11. A system as set forth in claim 10 wherein said predetermined value is 48 volts DC.

12. A system as set forth in claim 10 wherein said predetermined value is 200 amps DC.

13. A power supply system for providing reliable electrical power to a telecommunications facility, said facility containing telecommunications equipment, said system comprising:

at least one proton exchange membrane, said proton exchange membrane including a fuel input and an electrical output, said proton exchange membrane operable to convert fuel received at said fuel input to generate DC electrical power at said electrical output;

means for receiving AC electrical power from an AC power source;

at least one rectifier, said rectifier including an AC input and a DC output, said rectifier operable to convert AC electrical power received from said means for receiving AC electrical power at said AC input to DC electrical power at said DC output;

at least one capacitor coupled to said electrical output of said at least one proton exchange membrane and said DC output of said at least one rectifier; and

control means for switching from said DC power produced by said rectifiers to DC power produced by said at least one proton exchange membrane.

14. A system as set forth in claim 13 wherein said fuel for said at least one proton exchange membrane is hydrogen.

15. A system as set forth in claim 14 wherein said hydrogen is stored on site.

16. A system as set forth in claim 13 wherein said AC power source is a commercial utility.

17. A system as set forth in claim 13 wherein said AC power source is at least one microturbine generator.

18. A system as set forth in claim 13 wherein said AC power source is a diesel generator.

19. A system as set forth in claim 13 wherein said control means includes a switching mechanism coupled between said at least one proton exchange membrane and said at least one capacitor, said switching mechanism operable to be an open circuit so long as said DC output from said at least one proton exchange membrane remains below a predetermined value and to be a short circuit when said DC output from said at least one proton exchange membrane exceeds said predetermined value.

20. A system as set forth in claim 13 wherein said control means includes switching mechanism coupled between said AC power source and said at least one rectifier, said switching mechanism operable to be a short circuit so long as said DC output from said at least one proton exchange membrane remains below a predetermined value and to be an open circuit when said DC output from said at least one proton exchange membrane exceeds said predetermined value.

21. A method for supplying power to a telecommunications facility from a power supply system, said method comprising the following steps:

providing at least one proton exchange membrane, said proton exchange membrane operable to receive a fuel and to produce DC electrical power;

providing AC electrical power from an AC power source to at least one rectifier, said rectifier operable to convert said AC electrical power to DC electrical power;

providing said DC electrical power from said at least one rectifier to at least one capacitor;

providing said DC electrical power from said at least one rectifier to said telecommunications facility; and

when said DC electrical power from said at least one proton exchange membrane reaches a predetermined level, providing said DC electrical power to said at least one capacitor and to said telecommunications facility and terminating the receipt of said AC electrical power at said at least one rectifier.

22. A method as set forth in claim 21 further comprising the step of:

providing AC power from said AC power source to said at least one rectifiers if said DC electrical power from said proton exchange membrane falls below a predetermined value.

23. A method as set forth in claim 21 further comprising the step of providing fuel to said at least proton exchange membrane.